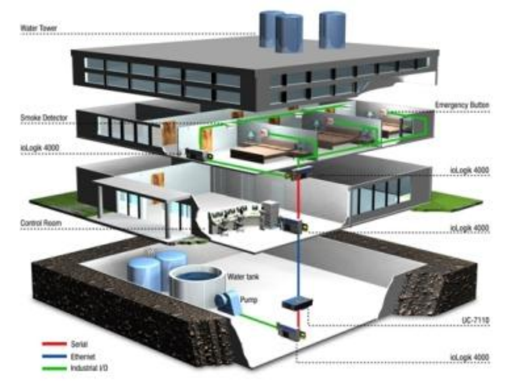
Helwan University
Faculty of Engineering – Mataria



A Course on

Conservation

Energy Management Systems

Ass.Prof **Adel Hussien**

2012

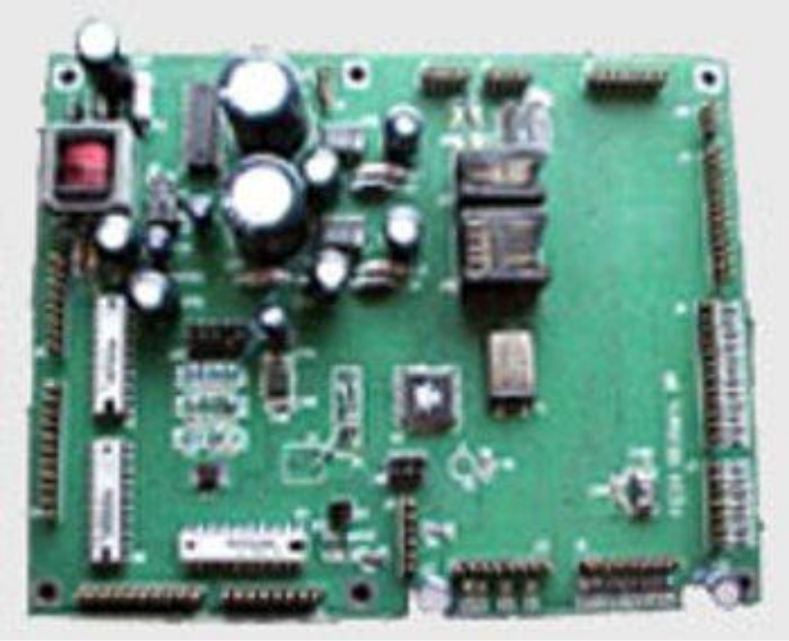
INTRODUCTION

Control or manage the use of energy.

INTRODUCTION

Microprocessor

Monitoring function

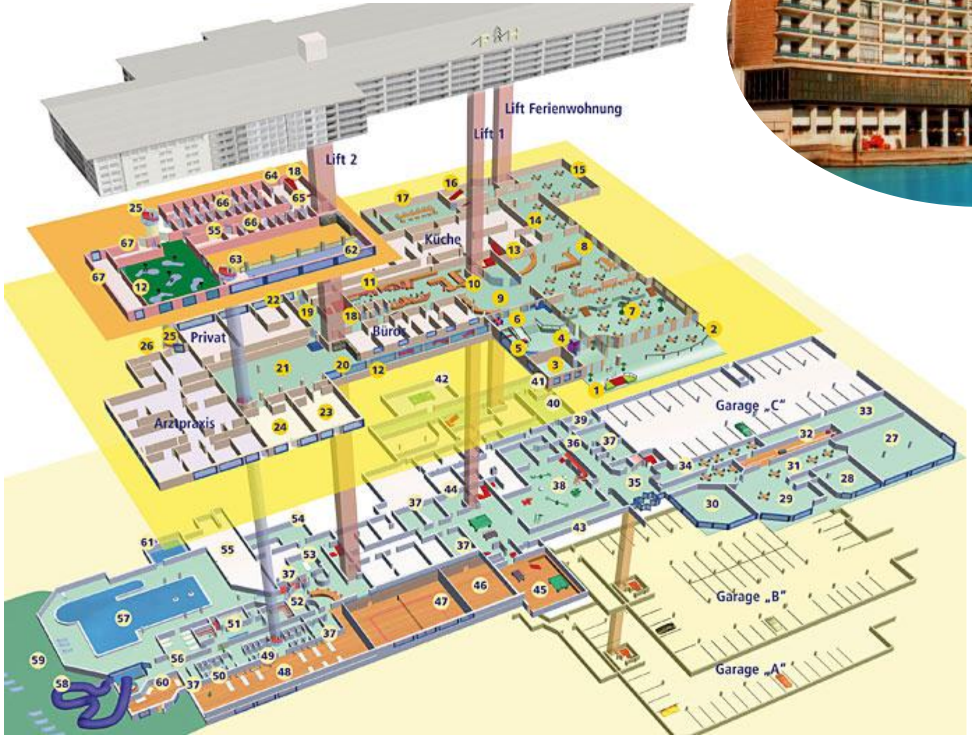


INTRODUCTION

Feasibility studies is of important for providing building owners, operators and engineers with:

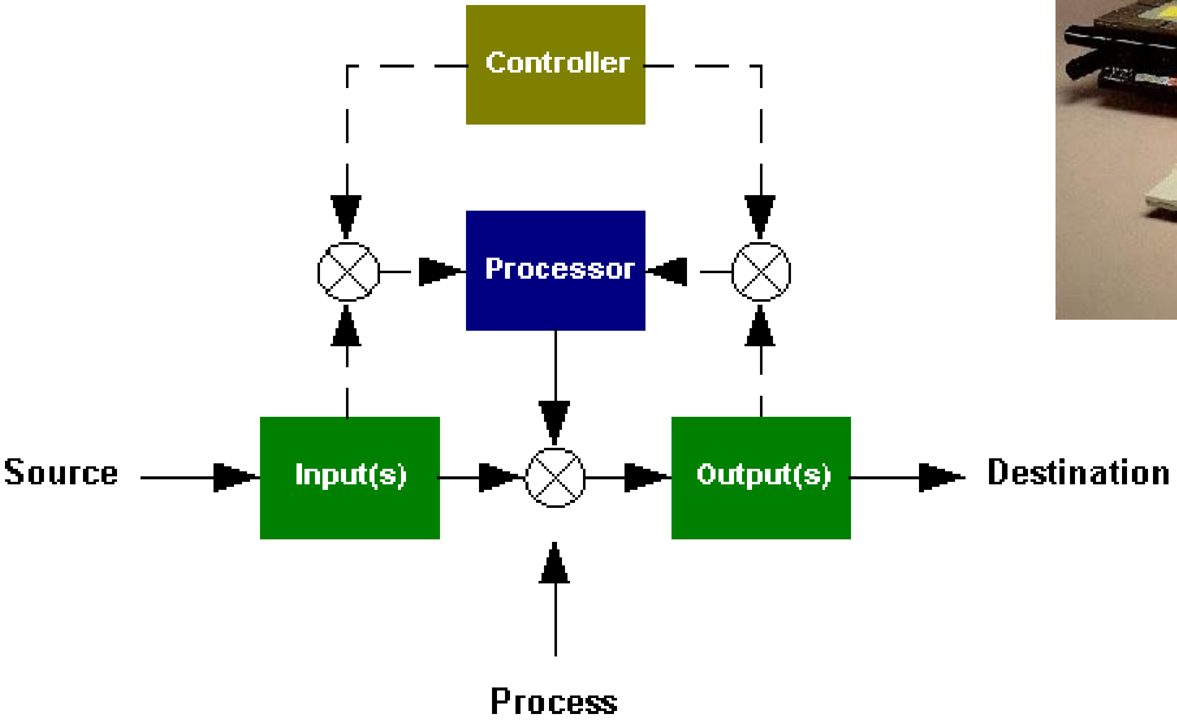
INTRODUCTION

1- Areas where EMS can be applied.



INTRODUCTION

2- Control strategy.

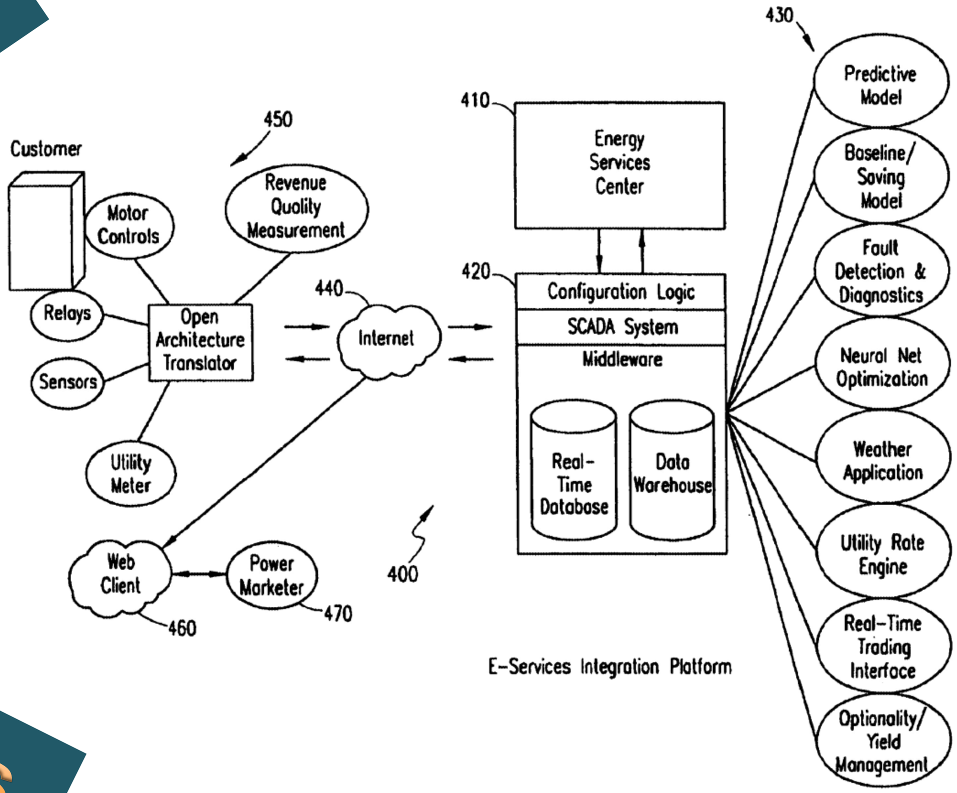


INTRODUCTION

3- Quantification of savings.

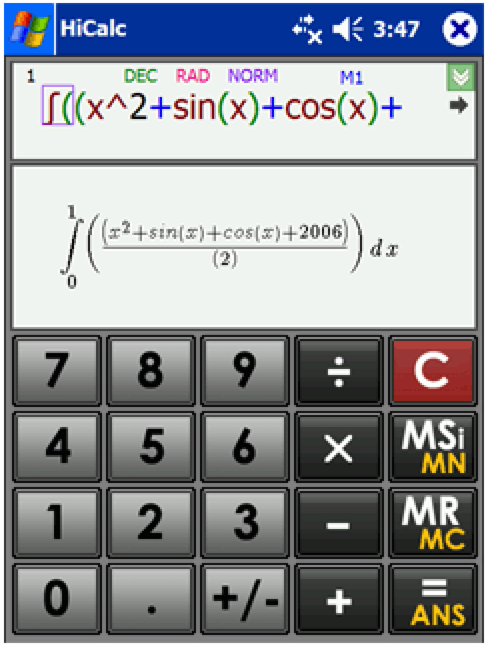
Energy savings.

Money savings.



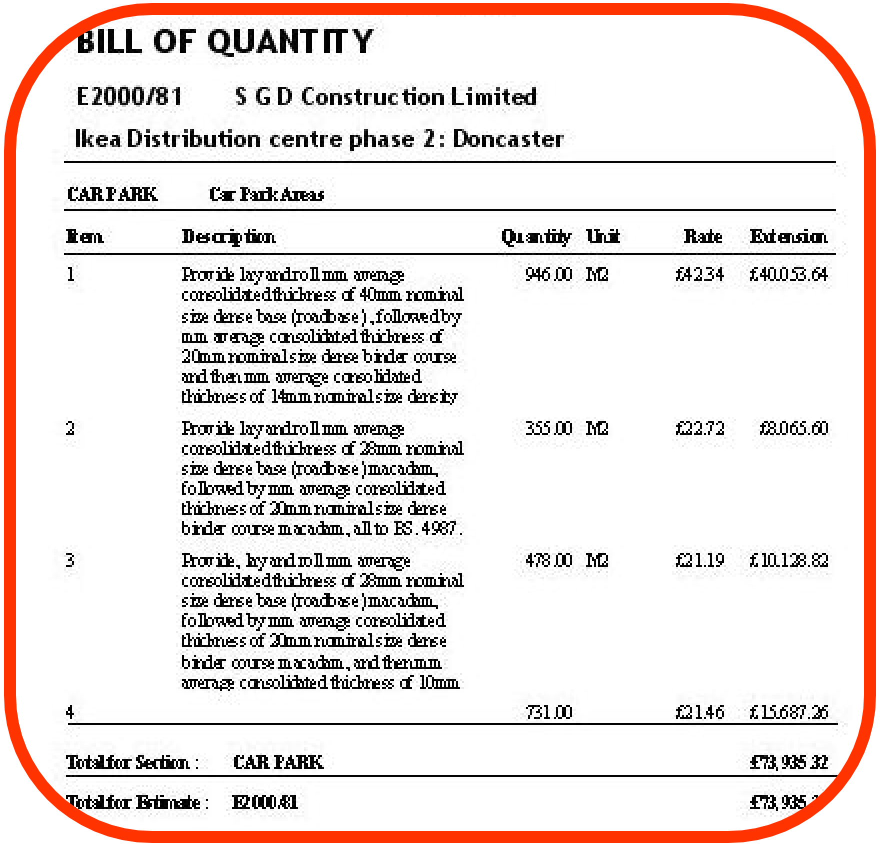
INTRODUCTION

4- Determination of EMS features and functions.



INTRODUCTION

5- Specifications for bidding.



BILL OF QUANTITY

E2000/81 S G D Construction Limited

Ikea Distribution centre phase 2: Doncaster

CAR PARK **Car Park Areas**

Item	Description	Quantity	Unit	Rate	Extension
1	Provide lay and roll mm average consolidated thickness of 40mm nominal size dense base (roadbase), followed by mm average consolidated thickness of 20mm nominal size dense binder course and then mm average consolidated thickness of 14mm nominal size density	946.00	M2	£42.34	£40,053.64
2	Provide lay and roll mm average consolidated thickness of 28mm nominal size dense base (roadbase) macadam, followed by mm average consolidated thickness of 20mm nominal size dense binder course macadam, all to BS. 4987.	355.00	M2	£22.72	£8,065.60
3	Provide, lay and roll mm average consolidated thickness of 28mm nominal size dense base (roadbase) macadam, followed by mm average consolidated thickness of 20mm nominal size dense binder course macadam, and then mm average consolidated thickness of 10mm	478.00	M2	£21.19	£10,128.82
4		731.00		£21.46	£15,687.26

Total for Section : **CAR PARK** **£73,935.32**

Total for Estimate : **E2000/81** **£73,935.**

INTRODUCTION

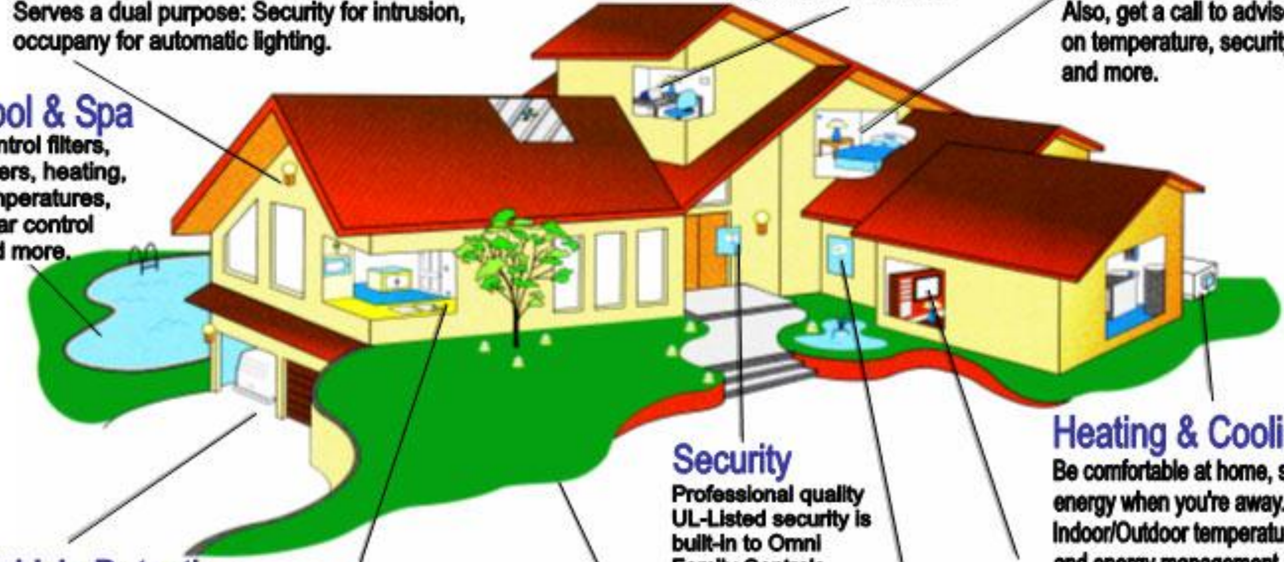
6- Proper EMS operation and maintenance.

APPLICATIONS

- Commercial buildings
- Industrial plan
- Institutional building
- Operation of boilers and chillers (plants)
- Hot water generators (buildings)
- Control peak electric demand.
- Etc.

EMS FUNCTIONS

Whole House Control



Internet
HAI Web-link II allows you to control and see status of your Omni System from anywhere via the web

Telephones
Control your Omni System for security, temperatures, and status via any phone at home or away. Also, get a call to advise on temperature, security and more.

Motion Detection
Serves a dual purpose: Security for intrusion, occupany for automatic lighting.

Pool & Spa
Control filters, timers, heating, temperatures, solar control and more.

Heating & Cooling
Be comfortable at home, save energy when you're away. Indoor/Outdoor temperature and energy management.

Security
Professional quality UL-Listed security is built-in to Omni Family Controls.

Vehicle Detection
Announce Visitors, turn on lights, and switch on TV to view driveway, etc.

Lighting
Architectural quality lighting control, passive security for "lived-in" look.

Irrigation
Omni Systems can control your irrigation solenoid valves for lawn sprinklers, plus inputs for rain sensing.

Multi Room Audio
Control music volume around the house with your Omni.

Omnistat™ by HAI
Communicating thermostats for heating & cooling control. Displays time and outdoor

Web-Link II for complete remote access to your Omni System

EMS FUNCTIONS

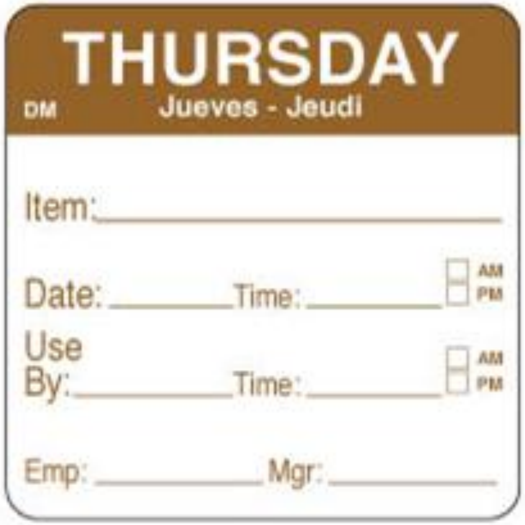
1- Fixed Interval ON/Off Control.

Time-of-day control

EMS FUNCTIONS

1- Fixed Interval ON/Off Control.

Time-of-day/day-of–week control



THURSDAY

DM

Jueves - Jeudi

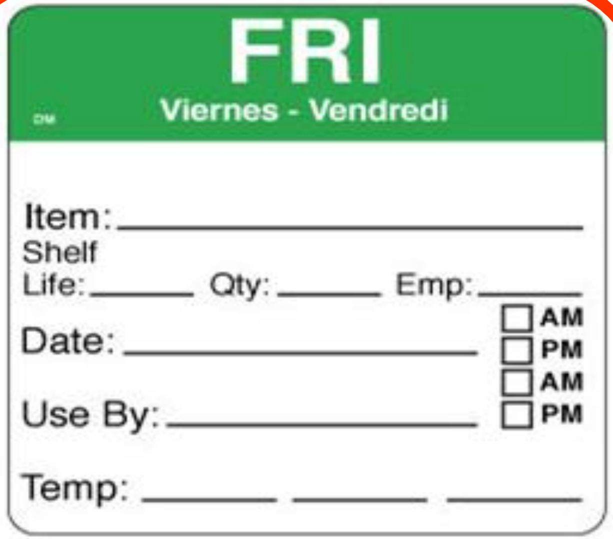
Item: ____________

Date: ______ Time: ______ ☐ AM ☐ PM

Use By: ______ Time: ______ ☐ AM ☐ PM

Emp: ______ Mgr: ______

2"
day-of-the-week label



FRI

DM

Viernes - Vendredi

Item: ____________

Shelf Life: ______ Qty: ______ Emp: ______

Date: ____________ ☐ AM ☐ PM

Use By: ____________ ☐ AM ☐ PM

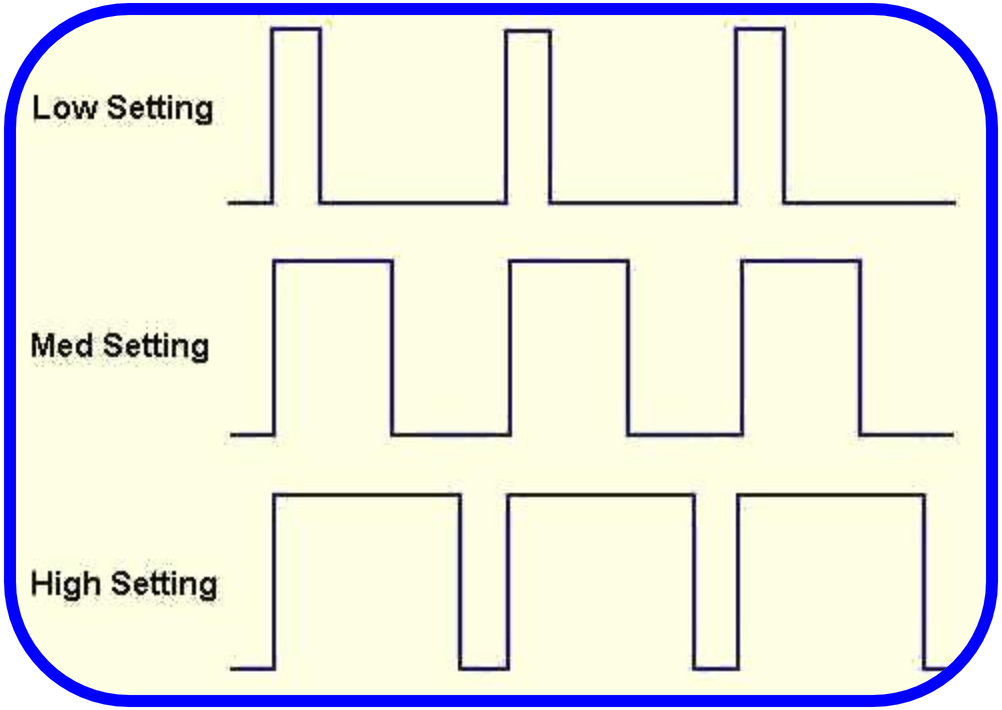
Temp: ______ ______ ______

2.5"
day-of-the-week label

EMS FUNCTIONS

1- Fixed Interval ON/Off Control.

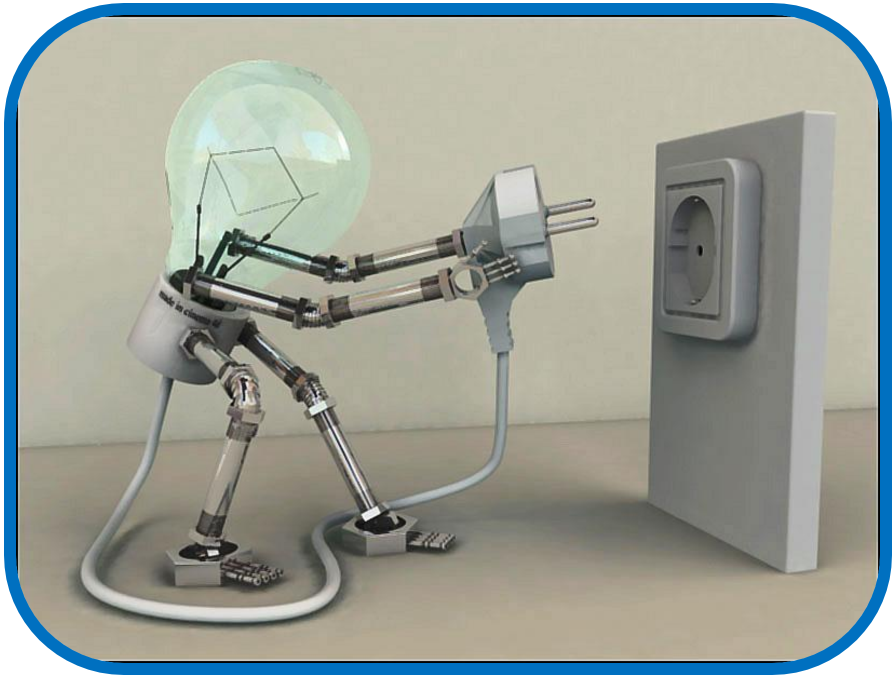
Duty cycling



EMS FUNCTIONS

2- On/Off Control with Outside Variable Dependence.

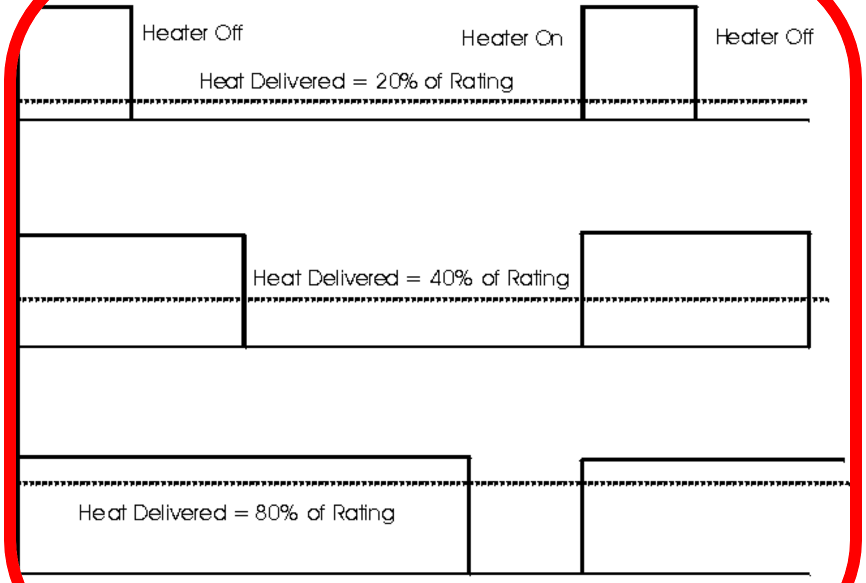
Optimum on/off control



EMS FUNCTIONS

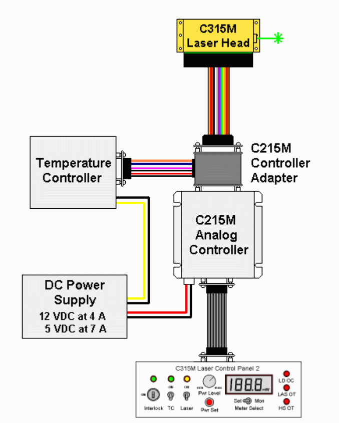
2- On/Off Control with Outside Variable Dependence.

Duty-cycling with temperature reset


Heater Off
Heater On
Heater Off
Heat Delivered = 20% of Rating
Heat Delivered = 40% of Rating
Heat Delivered = 80% of Rating

Heat Delivery Controlled by "Duty-Cycle"

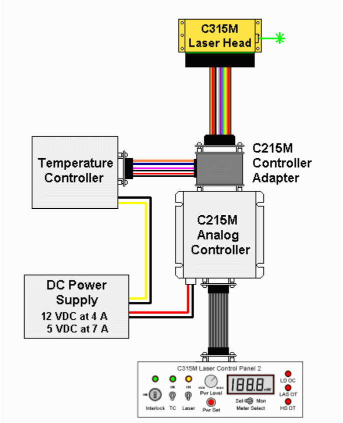
EMS FUNCTIONS



3- Other Temperature-Based Control Schemes.

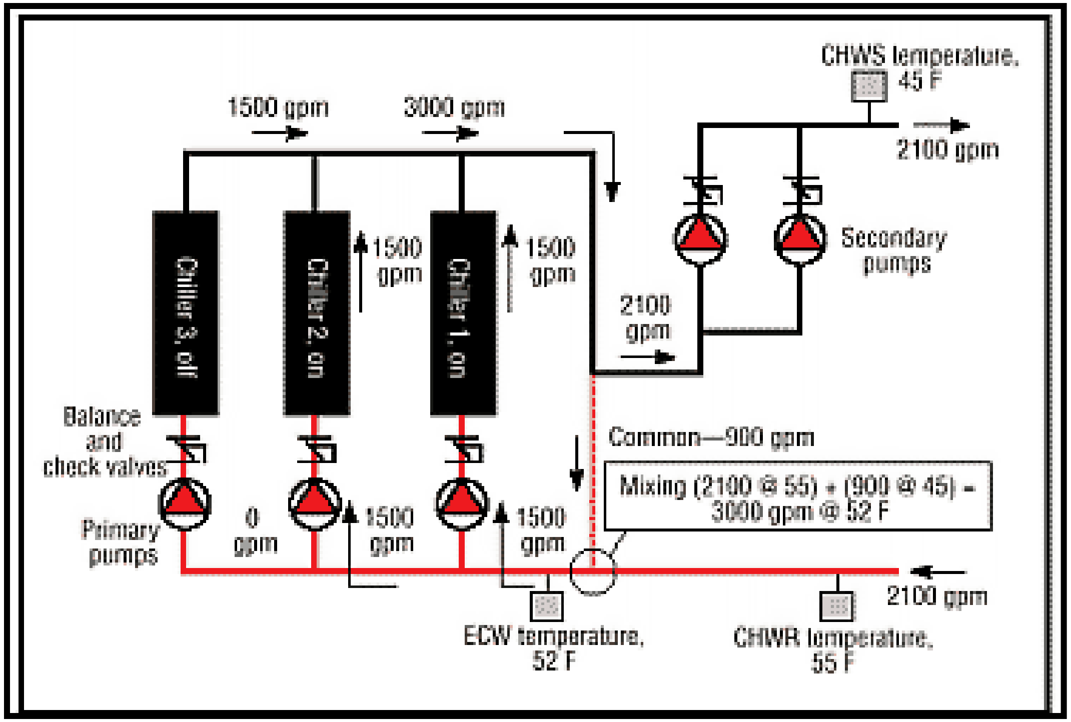
Night set-back/set-forward control

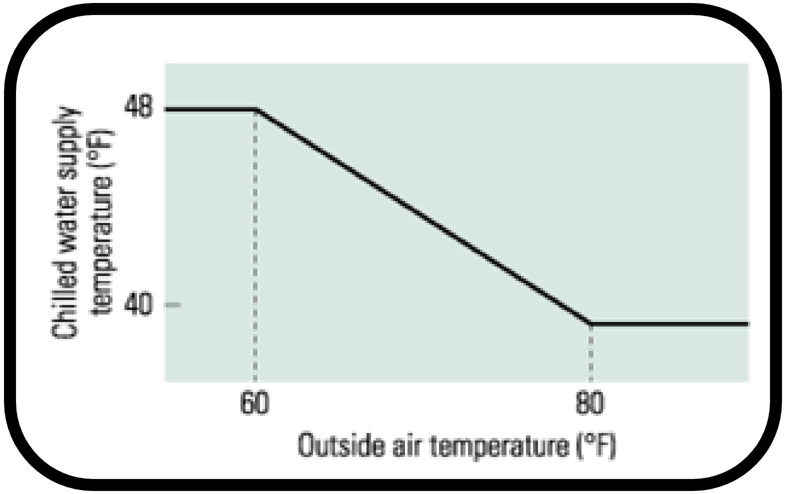
EMS FUNCTIONS



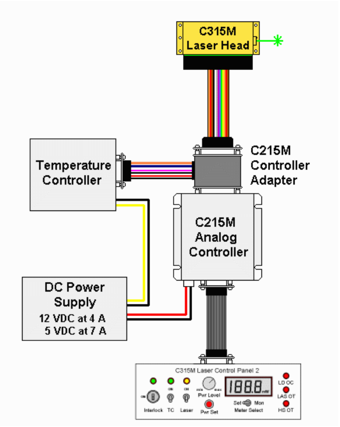
3- Other Temperature-Based Control Schemes.

Reset of chilled water temperature





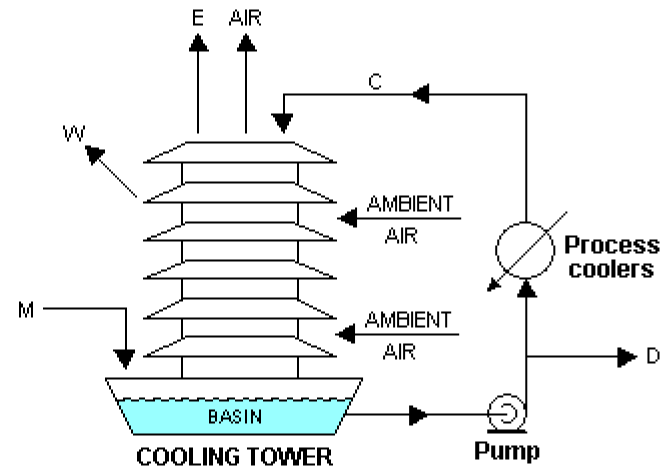
EMS FUNCTIONS



3- Other Temperature-Based Control Schemes.

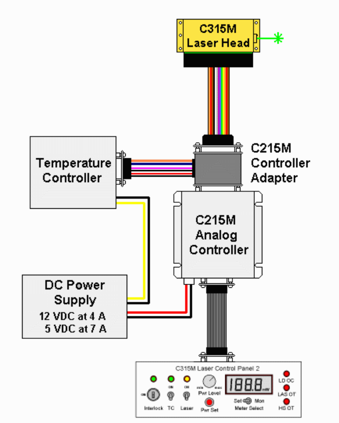
Control of cooling tower

COOLING TOWER SYSTEM



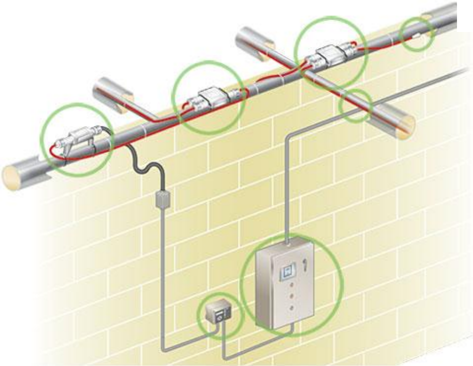
C = CIRCULATING COOLING WATER
E = EVAPORATED WATER
W = WINDAGE or DRIFT LOSS
M = MAKEUP WATER
D = DRAWOFF or BLOWDOWN WATER

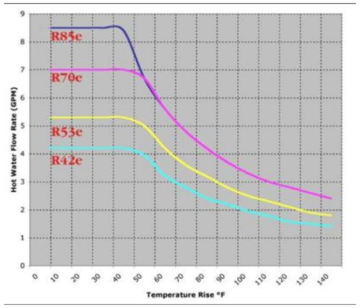
EMS FUNCTIONS

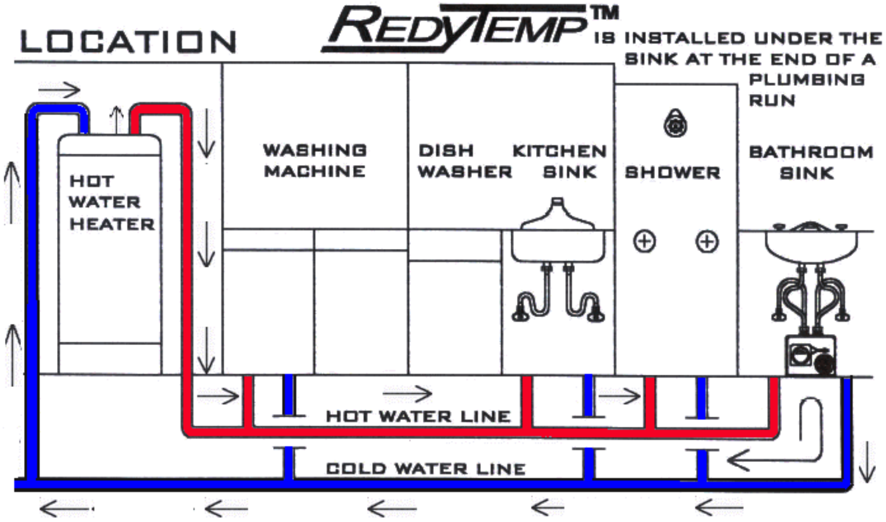


3- Other Temperature-Based Control Schemes.

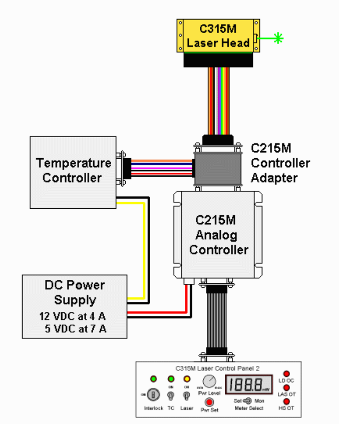
Reset of hot water temperatures





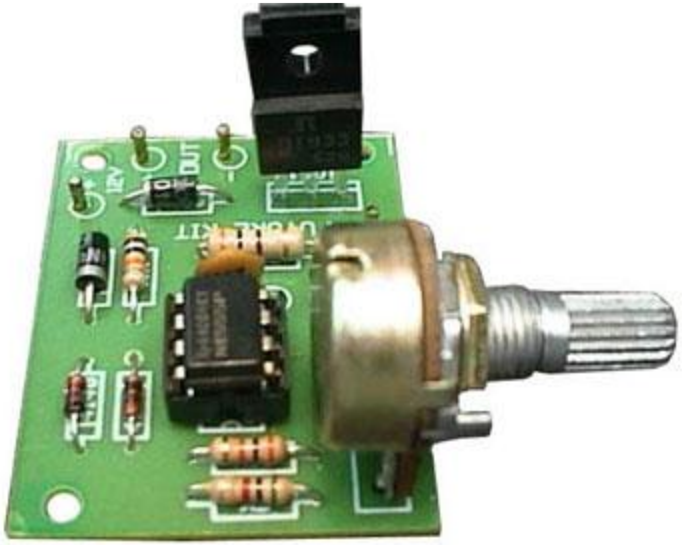


EMS FUNCTIONS



3- Other Temperature-Based Control Schemes.

Control of motor speeds



Bakatronics.com

Fully assembled ready to hook up and use.

EMS FUNCTIONS

4- Control of Peak Electric Demand

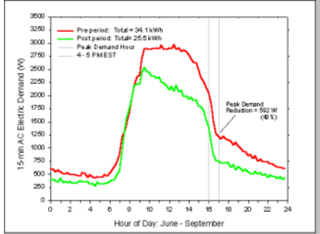
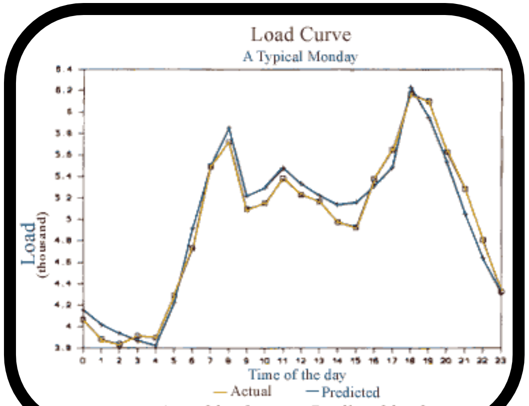
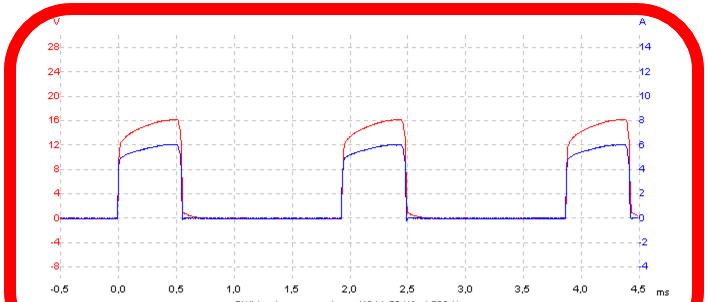


Figure 36. Average AC demand profile during pre and post treatment periods for all seven shops.



Actual load versus Predicted load



PWM pulse over car lamp (12 V, 50 W) at 500 Hz
Red: Voltage over lamp (V)
Blue: Current over lamp (A)

EMS FUNCTIONS

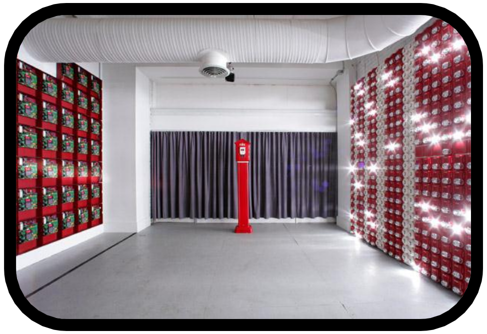
5- Monitoring and Reporting Functions

Energy consumption and demand

EMS FUNCTIONS

5- Monitoring and Reporting Functions

Malfunctions and alarms



EMS FUNCTIONS

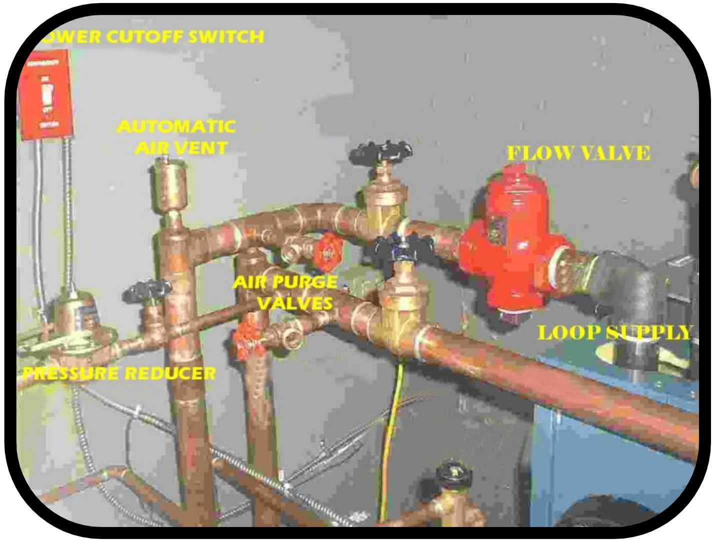
5- Monitoring and Reporting Functions

Fire and Security functions

EMS FUNCTIONS

5- Monitoring and Reporting Functions

Preventive maintenance functions



OPTIMIZATION CONTROL SYSTEMS

1- Chiller Optimization

1- Chiller soft start

2- Variable start-up loading

3- Lead-lag control

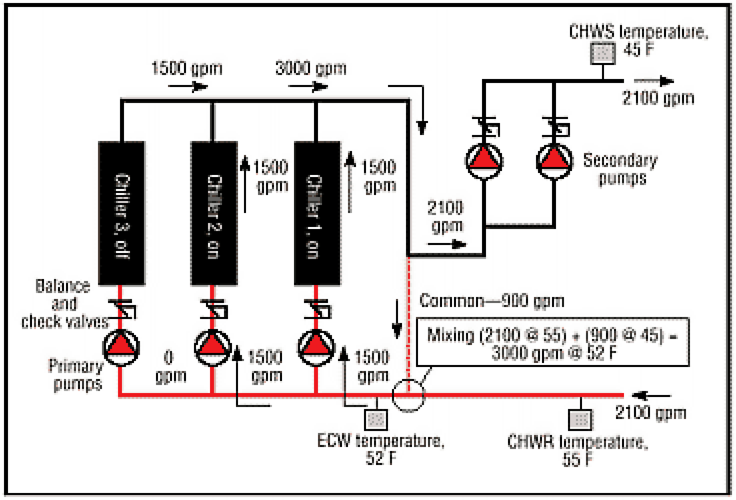


Fig. 6 Production flow greater than distribution flow.

OPTIMIZATION CONTROL SYSTEMS

2- Boiler Optimization

1- Combustion efficiency optemization

2- Boiler loading

3- Lead-lag sequence

DDC OVER PNEUMATIC CONTROLS

1- More precise errors are minimized.

2- Preventive maintenance functions

3- Retain callibration more accurately.

PROCEDURE

1- Energy consumption

2- Areas where EMS can be applied

3- Priority

4- Determination of control strategy

5- Quantification of energy savings

6- List of components and features

7- Specifications

8- Cost

9- Pay back

Thank you

Any questions

Preventive	وقائى
shed	سقف
Cure	معالجة